What is claimed is:

1. An amplitude-scaling resilient audio watermarking encoding apparatus based on a quantization, comprising:

a polyphase filterbank for dividing an inputted audio signal into a plurality of subbands;

a psychoacoustic module for applying a psychoacoustic model to the inputted audio signal to provide a signal-to-mask ratio (SMR);

a watermark encoder for evaluating an encoding parameter from the plurality of subbands according to the signal-to-mask ratio (SMR) provided from the psychoacoustic module and embedding the encoding parameter and a watermark into subbands having middle frequency subbands among the plurality of subbands; and

a synthesis filterbank for synthesizing the divided and watermarked subband signals to output a watermarked audio signal.

2. The amplitude-scaling resilient audio watermarking encoding apparatus of claim 1, wherein the watermark encoder includes:

a parameter evaluator for evaluating the encoding parameter value (Δ_e, α) from the signal-to-mask ratio provided from the psychoacoustic model and an estimation value (WNR) of a noise intensity determined by a specification of a lossy compression;

a quantizer for performing an uniform scalar quantization with respect to an audio signal x_n according to the quantizer step size Δ_e of an encoder by using a quantizer selected by a watermark d_n;

an adder for subtracting the host signal x_n from an output of the quantizer;

a multiplier for multiplying an output of the adder by the scale α; and

an adder for adding an output of the multiplier to the host signal x_n to output a watermarked subband signal s_n.

3. An amplitude-scaling resilient audio watermarking decoding apparatus based on a quantization, comprising:

a polyphase filterbank for dividing a received audio signal into the predetermined number of subbands;

an expectation maximization (EM) estimator for estimating an scale factor from an encoding parameter contained in the received audio signal and a watermarked subband according to an EM algorithm, and generating the quantizer step size Δ_d of a decoder according to the amplitude-scaling;

a watermark decoder for extracting a watermark from a subband corresponding to the middle frequency considering the quantizer step size; and

an integrated determiner for integrating outputs of the watermark decoder to determine a watermark.

4. A method for encoding an audio signal, comprising the steps of:

dividing an inputted audio signal into subbands;

applying a psychoacoustic model to the audio signal to evaluate a signal-to-mask ratio (SMR);

evaluating an encoding parameter from the signal-to-mask ratio (SMR);

encoding a watermark in each subband according to the evaluated encoding parameter;

synthesizing the watermarked subbands; and

transmitting watermarked audio signal and the encoding parameter.

5. The method of claim 4, wherein the step of encoding the watermark is performed by embedding the watermark in middle frequency subbands.

6. A method for decoding an audio signal, the audio signal being encoded by the method of claim 4, the method comprising the steps of:

receiving the audio signal and a side information;

dividing the audio signal into subbands;

estimating an scale factor from the side information and the received audio signal by using an expectation maximization (EM) algorithm, and evaluating the quantizer step size of a decoder from the estimated amplitude-scale rate;

decoding a watermark from the subbands considering the evaluated quantizer step size; and

summing up the decoded values to calculate an average, and calculating a correlation between the average and codes of a codebook to obtain a watermark.

7. The method of claim 6, wherein the quantizer step size Δ_d is calculated by multiplying the received quantizer step size of the encoder by the estimated scale factor.